Exhibit 3

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(73) Proprietor: RUSSELL MATTHEWS INDUSTRIES LIMITED
Devon Road
New Plymouth (NZ)

(72) Inventor: Matthews, John Brodie
Sutton Road
Omata, New Plymouth (NZ)
Inventor: Keller, Roger Hubert
288 Mangorei Road
New Plymouth (NZ)

(74) Representative: Tregear, George Herbert Benjamin et al,
LLOYD WISE, TREGEAR & CO Norman House
105-109 Strand
London WC2R 0AE (GB)

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Description

This invention relates to the packaging or containing of bituminous products.

The transportation of bulk bituminous products is normally by sea in shipping tanker vessels and on land in large steel rail or road tankers. These tankers are sometimes insulated to assist in retaining heat energy and may also be equipped with heating tubes and pumping gear. Smaller quantities are usually transported in 150 or 200 litre steel drums or similar containers which must be either broken open or heated by the end user in order to extract the bitumen.

The packaging and transportation costs for bituminous products are thus high, especially when the packaging container may not be suitable for reuse once the bituminous product has been removed or where the container must be returned empty for refilling. It would for example, be desirable to be able to provide a packaging method and means whereby a conventional transportation container could be used for transporting the bituminous product to some destination and then the container be reused, or used for some other purpose. For lighter or less quantities of the bituminous product, it would be desirable to have a packaging method or means whereby the bituminous contents are readily accessible and the packaging means was dispensible.

Many and various attempts have been made to devise packages in which bituminous products may be contained, however, one of the main problems to overcome is to provide some way to prevent the bitumen for adhering to the packaging material (cf. FR—A—1082174). For example, it is known to provide a cardboard container into which the bitumen can be loaded and to prevent the bitumen from adhering to the container a coating of a material to which bitumen will not adhere is applied to the inside of the container. Alternatively, it is known to make the inner liner from a material which will adhere to the bitumen but not the cardboard outer. The liner material in this form is a material which is compatible with the bitumen and can be melted into the bitumen prior to use.

These known packages have in the main not been successful though some limited success has been achieved with high melt temperature bitumens. With roading grade bitumens the problem of movement through the casing arises and this has been one of the main reasons for the failure of previously developed packaging. A further reason arises from the fact that the materials which are compatible with the bitumen and melt with the bitumen on heating and have viscosities on heating which enable them to be applied with the bitumen do not have sufficient tensile strength to contain by themselves the bitumen so that the casing is prone to rupture. For example, this can occur when such casings are being filled with the bitumen or when the ambient temperature during storage or transportation is high.

It is known from prior U.S. patent 3366233 to package bitumen in a single or multilayer container of polyethylene and/or polypropylene film. The object of such a container was to provide a package of bituminous product which when heated to spraying or application temperature the film of the container melted and became mixed with the product itself. A disadvantage in the use of polypropylene is that at spraying temperature the viscosity of the polypropylene is not sufficiently similar to the viscosity of the bitumen to enable it to be sprayed with the bitumen at the temperature at which the bitumen is applied in use.

As disclosed in U.S. patent 3366233 problems arise with movement of components of the bitumen through the polyethylene film. To overcome this problem U.S. patent 3366233 recommends the use of a multilayer container but this does not overcome a further lack of strength problem associated with the use of such polyethylene and polypropylene films as actual containers or for the lining of cardboard or kraft paper containers.

Polyethylenes with the required low melting point characteristics do not have a high tensile strength and thus in a single layer or a thin multilayer arrangement a polyethylene film container by itself is not strong enough to contain bitumen. The tensile strength falls off very quickly as the temperature of the polyethylene rises and thus in climates where the ambient temperature can rise to say 30—40°C it is likely the polyethylene film will fail and allow release of the contents. Notwithstanding the temperature/strength problem, polyethylene film containers do not have sufficient strength for satisfactory stacking of such containers for storage or transportation. Polypropylene has only a slightly higher tensile strength than polyethylene and also suffers from the temperature problem described above.

To enable bitumen to be flowed into the packaging container the temperature must be raised to one at which the bitumen can flow. Where a film as proposed in U.S. patent 3366233 is used the temperature of the film on filling with such bitumen also increases and the strength of the film consequently decreases. Once filled the container cannot be moved until the temperature has lowered sufficiently for the container to once more be strong enough to not rupture though as mentioned above a polyethylene film by itself does not provide a sufficiently strong container even at temperatures after cooling of the bitumen. To overcome this problem it has been recommended in U.K. patent 1299161 to support the package in a water bath to prevent the temperature of the container from increasing to a level where its strength is reduced. This method involves high capital cost and is slow and inefficient.

The use of say polyethylene film inside a

cardboard or kraft outer is also not successful because oil movement through the film still occurs and can readily stick the inner film to the outer container so that the contents cannot easily be removed. Furthermore oil movement into or through the outer container can lead to such problems as loss of strength of the container, messiness in handling, contamination of other products and fire hazard. Cardboard or kraft containers are also susceptible to water damage and consequent loss of strength unless further protected. Such packaging techniques are also less economic than the packaging of this present invention.

According to the present invention a package of bitumen comprises a volume of bitumen encased in a flexible container comprising an inner layer of flexible plastics material and an outer layer of flexible material, wherein the bitumen is paving grade bitumen having a softening temperature which lies in the range of 60 to 120°C and an application temperature of 100 to 180°C, and the inner layer is of a flexible plastics material in a tubular form, said inner layer being of a plastics material which has a softening temperature greater than the temperature of the bitumen when the container is being filled but lower than the application temperature of the bitumen, the inner layer with the contained bitumen being encased within the outer layer, and the outer layer is of a flexible plastics material also in a tubular form, the plastics material of the outer layer having a softening temperature which is such that melting does not occur at the bitumen application temperature, said inner and outer layers being sealed at one end prior to the inner layer being filled with said bitumen and sealed together at the other end once filling has been completed, the outer layer being in overall contact with the inner layer and having strength characteristics such as to provide overall support to the inner layer during filling thereof with bitumen, said outer layer being resistant to the passage therethrough of the bitumen or the oily constituents thereof and not adhering to the inner layer whereby it can be readily stripped from the inner layer to leave the bitumen contained solely within the inner layer, the plastics material from which the inner layer is constructed having a viscosity at the bitumen application temperature which enables the inner layer to be melted with the bitumen to be applied therewith.

The invention thus provides a container for containment of a bituminous product wherein the outer casing prevents the movement of components of the bitumen and other petroleum products that may be contained as additives in the bitumen such as, for example, kerosene, diesel (automotive gas oil) and mineral turpentine.

In the following more detailed description of the invention according to its preferred form, reference will be made to bituminous products which term is understood to include bitumen, asphalt, tar, pitch and bitumen and asphalt mastics, however, the present invention is more particularly relevant to roading or paving grade bitumen.

In the following description reference will be made to the accompanying drawings in which:—

Figure 1 is a longitudinal cross-sectioned view of a container according to the invention when filled with a bituminous product,

Figure 2 is a transverse cross-section view on line I—II, and

Figure 3 is a view similar to that of Figure 2 but showing a further form of the invention.

In the drawings the thickness of the films has been exaggerated in the interest of clarity.

According to the preferred form, the inner and outer flexible casings 10 and 11 respectively are of seamless tubular construction with the inner casing 10 being of a material which is a low density polyethylene with a density of 0.910 to 0.925, or other similar copolymeric film, and the outer casing material is a high melting polyamide film e.g. polycaproamide (Nylon 6). In the preferred form the polyethylene is of a thickness in the range of 20 to 70 microns (0.02 to 0.07 mm) whilst the polyamide film is 20 to 100 microns (0.02 to 0.1 mm) in thickness. These materials are by way of example only (being suitable for containing road or paving grade bitumens) as other polymer or copolymer materials having the following described characteristics would be suitable. The inner casing material preferably has a softening temperature which lies in the range 60—120°C. The temperature at which paving grade bituminous products can be sprayed is usually within the temperature range of 100—180°C and in this range, the material has melted to a sufficiently low viscosity to enable it to be applied with the bituminous product when it is applied in use. The material is also suitable for use in conjunction with bituminous products in the percentage in which it is present because it has a similar density, is as thermally stable as the bitumen at the temperature at which bituminous products are applied in use, does not significantly alter the elasticity or adhesiveness of the bitumen, nor is it biodegradable. The polyethylene when melted with the bitumen is not poisonous, corrosive or explosive and does not emit volatile or noxious vapours.

The inner casing material is not sufficiently strong to contain the bitumen during filling or permit safe transport, and the outer wall of the casing which is of substantially the same diameter is sufficiently strong to perform the function of containing the inner casing and bitumen. The nylon 6 material has a tensile strength which is high especially at the temperatures at which the bitumen is flowing into the tubing. The high melting point of the nylon is also an asset in the event that by mistake

some of it is loaded into the tank of the sprayer. With the high melt point range of 195°C to 220°C the nylon does not melt at the spraying temperature at which the bituminous product is applied. It can therefore be readily removed from the machine or trapped in the filter unit which is a normal component in such spraying machines.

Bitumen may be mixed with diesel (automotive gas oil) or kerosene or turpentine or other petroleum products (such processes known as fluxes, cut backs, blends or additives). Such additives or the components of bitumen do not cause problems by moving through the outer nylon casing. Nylon does not corrode as a metal would, resists hydrolysis and microbiological attack.

Water contamination of bitumen (other than emulsified bitumen) is a serious problem because when the bitumen is heated for use, the water will boil off when the temperature reaches its boiling point and excessive foaming of the bitumen will occur. This foaming bitumen may overflow from the tank with consequent danger to personnel, fire hazard and loss of product and general messiness. The nylon outer casing is waterproof, and thus minimises such problems.

The inner and outer casings 10 and 11 are conveniently constructed as a double walled tubing of the required size and shape and in use a length of the double walled tubing is closed at one end and the bituminous product B is poured into the inner tubing. The outer tubing 11 is in overall intimate contact with the inner tubing 10 so that the inner tubing is thus provided with support during the filling operation. It is preferred, however, that the outer tubing is supported within a rigid mould or former during the filling operation. Once the tubing is filled with the bituminous product B, it is closed and can then be moved immediately into a storage area, stacked or placed into small or large transporting containers. Because the softening point of the inner tubing is above the temperature at which the bituminous product is introduced, no deleterious effects are experienced. While the tensile strength of the inner tubing decreases because of the increase in temperature to the extent whereby it is unable to contain the bitumen by itself this is not a problem as the tensile strength of the outer tubing is great enough to support the inner tubing.

The packaged bituminous product can then be transported to the end user either as separate packages or in containers. The package is not insulated or heated for transportation purposes. Typically, but not exclusively, the packaged product would weigh between 25 kg and 50 kg to facilitate ease of handling. Furthermore, the ends 15 of the casings 10, 11 may extend for approximately 100 mm beyond the seals or clips 12, such ends 15 acting as convenient handles.

The ends of the tubing can be sealed by gathering together the end and clipping with a leakproof tie or clamp 12. Alternatively, the end can be placed in a heat sealer which due to the non-compatible nature of the nylon and polyethylene only the inner tube of polyethylene becomes sealed as can be seen at 13. To seal the outer tubing the end is gathered and clipped as aforementioned (see left hand end of container shown in Figure 1).

To recover the bituminous product, the outer tubing material is stripped off, and the inner tubing material containing the bituminous product is placed in a heating unit (which may also be a sprayer for applying the product) and heated to the application temperature typically in the range 100°—180°C, whereupon the inner tubing material and bituminous product both melt. The resultant product can be applied in the usual manner by spraying to the surface being coated, or mixing with any other products in manufacturing processes. In view of the properties of the inner tubing material noted above, and its small proportion of less than 0.2% weight for weight with the contained bitumen product, the presence of the tubing material in the bituminous product does not significantly affect the physical properties or the effectiveness of the bituminous product. Whilst the low density polyethylene has a viscosity higher than the bituminous product at any temperature its characteristics enable it to disperse into the bituminous product at the normal application temperature range of 100°—180°C and the resultant product mixture may be applied in the normal manner.

For ease of separation of the inner and outer casings it is desirable that the casings do not adhere to one another. To ensure that they do not adhere to one another a release agent or slip additive can be incorporated.

For example a slip additive can be contained directly in the polyethylene inner casing or the nylon outer casing. With such an arrangement the inner casing can be for example of 60 microns (0.06 mm) thick (it including the slip material) whilst the outer casing is 90 microns (0.09 mm) thick. These dimensions are by way of example only. The inner and outer casing can conveniently be formed in a co-extrusion method.

In a further form (Figure 3) the inner and outer casings can be formed in a triextrusion method with a slip additive or release agent incorporated as an intermediate layer between the inner and outer casings. This type of container can be achieved by triextruding, for example nylon 6 and low density polyethylene to form the outer and inner casings 10 and 11 and an intermediate film 14 of low density polyethylene slip masterbatch. The compound used in the slip masterbatch can be, for example, Eurlcamide or an Oleomide as neither will oddise the bitumen. With such an extrusion of the three layers the thickness of the layers can be, by way of example, 60 microns (0.06 mm)

nylon, 20 microns (0.02 mm) low density polyethylene slip masterbatch and 20 microns (0.02 mm) of low density polyethylene.

The invention thus provides a simple but effective and economic method and means for packaging bituminous products. The bituminous product can be readily handled and transported by conventional means of transport such as containers. The outer casing material of the package provides a strong casing through which the contained petroleum products do not move and provides a package that can be packed and stacked and does not stick together. The outer casing can be readily stripped from the inner casing containing the bitumen. The inner casing material of the package containing the bitumen can be readily applied with the bitumen at the temperature at which the bitumen is applied in use obviating the difficulty of removing the bituminous products from conventional containers, including the need for wasteful and inefficient heating and handling thereof.

Claims

1. A package of bitumen comprising a volume of bitumen encased in a flexible container comprising an inner layer (10) of flexible plastics material and an outer layer (11) of flexible material, characterised in that the bitumen is paving grade bitumen having a softening temperature which lies in the range of 60 to 120°C and an application temperature of 100 to 180°C, that the inner layer (10) is of a flexible plastics material in a tubular form, said inner layer being of a plastics material which has a softening temperature greater than the temperature of the bitumen when the container is being filled but lower than the application temperature of the bitumen, the inner layer (10) with the contained bitumen being encased within the outer layer (11), and that the outer layer (11) is of a flexible plastics material also in a tubular form, the plastics material of the outer layer having a softening temperature which is such that melting does not occur at the bitumen application temperature, said inner and outer layers (10, 11) being sealed at one end prior to the inner layer being filled with said bitumen and sealed together at the other end once filling has been completed, the outer layer (11) being in overall contact with the inner layer (10) and having strength characteristics such as to provide over-all support to the inner layer during filling thereof with bitumen, said outer layer being resistant to the passage therethrough of the bitumen or the oily constituents thereof and not adhering to the inner layer whereby it can be readily stripped from the inner layer to leave the bitumen contained solely within the inner layer, the plastics material from which the inner layer is constructed having a viscosity at the bitumen application temperature which enables the inner layer to be melted with the bitumen to be applied therewith.

2. A package as claimed in Claim 1, wherein the inner and outer layers (10, 11) are of seamless tubular construction and are of substantially the same diameters.

3. A package as claimed in Claim 2, wherein the inner layer (10) is formed of a low density polyethylene film and the outer layer (11) is formed of a high melting polyamide film.

4. A package as claimed in Claim 3, wherein the polyethylene film is of a thickness in the range of 0.02 to 0.07 mm and the polyamide film is of a thickness in the range of 0.02 to 0.1 mm.

5. A package as claimed in Claim 2, 3 or 4, wherein a slip material is incorporated between or in the inner and/or outer layers.

6. A package as claimed in Claim 5, wherein the slip material is a low density polyethylene masterbatch containing a slip additive.

7. A package as claimed in Claim 6, wherein the low density polyethylene masterbatch containing a slip additive is incorporated with either or both of the inner or outer layers (10, 11) so as to provide a slip surface at the interface of said inner and outer layers.

8. A package as claimed in any one of the preceding claims, wherein the outer layer (11) is impervious to movement therethrough of a contained bituminous product, components thereof or other petroleum additives that may be contained in the bituminous product.

Revendications

1. Emballage de bitume, comprenant un certain volume de bitume enveloppé dans un récipient souple comprenant une couche interne (10) de matière plastique souple et une couche externe (11) de matière souple, caractérisé en ce que le bitume est un bitume de qualité pour revêtement routier ayant une température de ramollissement comprise entre 60 et 120°C et une température d'application comprise entre 100 et 180°C, et ce que la couche interne (10) est une matière plastique sous forme tubulaire, la couche interne étant une matière plastique dont la température de ramollissement est supérieure à la température du bitume lorsque le récipient est en cours de remplissage mais est inférieure à la température d'application du bitume, la couche interne (10) avec le bitume contenu étant enveloppée dans la couche externe (11), et en ce que la couche externe (11) est une matière plastique souple qui est aussi sous forme tubulaire, la matière plastique de la couche externe ayant une température de ramollissement telle que la fusion n'a pas lieu à la température d'application du bitume, les couches interne et externe (10, 11) étant fermées de manière étanche à une première extrémité avant remplissage de la couche interne par le bitume et étant fermées de manière étanche à l'autre extrémité lorsque le remplissage a été terminé, la couche externe (11) étant en contact global avec la couche interne (10)

et ayant des caractéristiques de résistance mécanique telles qu'elles assure le support global de la couche interne pendant son remplissage par le bitume, la couche externe résistant à la traversée par le bitume ou les constituants huileux de celui-ci et n'adhérant pas à la couche interne, si bien qu'elle peut être facilement séparée de la couche interne en laissant le bitume contenu uniquement dans la couche interne, la matière plastique dont est formée la couche interne ayant une viscosité, à la température d'application du bitume, qui permet à la couche interne de s'associer par fusion au bitume et d'être appliquée avec lui.

2. Emballage selon la revendication 1, dans lequel les couches interne et externe (10, 11) ont une construction tubulaire sans soudure et ont pratiquement le même diamètre.

3. Emballage selon la revendication 2, dans lequel la couche interne (10) est formée d'un film de polyéthylène basse densité et la couche externe (11) est formée d'un film de polyamide à température élevée de fusion.

4. Emballage selon la revendication 3, dans lequel le film de polyéthylène a une épaisseur comprise entre 0,02 et 0,07 mm et le film de polyamide a une épaisseur comprise entre 0,02 et 0,1 mm.

5. Emballage selon l'une quelconque des revendications 2 à 4, dans lequel une matière anti-adhésive est incorporée entre les couches interne et externe ou dans au moins l'une des couches interne et externe.

6. Emballage selon la revendication 5, dans lequel la matière anti-adhésive est une composition de polyéthylène basse densité contenant un adjuvant anti-adhésif (7).

7. Emballage selon la revendication 6, dans lequel la composition de polyéthylène basse densité contenant un adjuvant anti-adhésif est incorporée à l'une au moins des couches interne et externe (10, 11) afin qu'elle forme une surface anti-adhésive à l'interface des couches interne et externe.

8. Emballage selon l'une quelconque des revendications précédentes, dans lequel la couche externe (11) est imperméable à la traversée d'un produit bitumineux contenu, de ses constituants ou d'adjuvants du pétrole qui peuvent être contenus dans le produit bitumineux.

Patentansprüche

1. Bitumenpackung mit einem Volumen an Bitumen, das in einem flexiblen Behälter eingeschlossen ist, mit einer inneren Schicht (10) aus flexiblem Kunststoffmaterial sowie einer äußeren Schicht (11) aus flexiblem Material, dadurch gekennzeichnet, daß es sich bei dem Bitumen um ein Bitumen von Straßenasphaltierungsqualität handelt, mit einer Erweichungstemperatur, die im Bereich von 60 bis 120°C liegt, und einer Anwendungstemperatur von 100 bis 180°C, daß die innere Schicht (10) aus einem flexiblen Kunststoffmaterial in Schlauchform besteht, wobei diese innere Schicht aus einem Kunststoffmaterial besteht, das eine Erweichungstemperatur besitzt, die höher ist als diejenige des Bitumens, wenn die Packung gefüllt wird, jedoch niedriger als die Anwendungstemperatur des Bitumens, wobei die innere Schicht (10), die das Bitumen enthält, von der äußeren Schicht (11) eingeschlossen ist, und daß die äußere Schicht (11) aus einem flexiblen Kunststoffmaterial ebenfalls in Schlauchform besteht, wobei das Kunststoffmaterial der äußeren Schicht eine Erweichungstemperatur besitzt, die derart ist, daß ein Schmelzen bei der Bitumenanwendungstemperatur nicht eintritt, und die innere und äußere Schicht (10, 11) an einem Ende verschlossen sind, bevor die innere Schicht mit dem Bitumen gefüllt wird, während das andere Ende zusammen verschlossen wird, nachdem das Einfüllen abgeschlossen ist, wobei die äußere Schicht (11) insgesamt in Kontakt mit der inneren Schicht (10) steht und solche Festigkeitseigenschaften besitzt, daß eine Gesamtabstützung der inneren Schicht während der Einfüllung des Bitumens gegeben ist, und die äußere widerstandsfähig ist gegenüber einem Durchdringen des Bitumens oder dessen öliger Bestandteile und nicht an der inneren Schicht anhaftet, so daß sie leicht von der inneren Schicht abstreifbar ist, unter Zurücklassung des Bitumens, das sich allein innerhalb der inneren Schicht befindet, wobei das Kunststoffmaterial, aus welchem die innere Schicht aufgebaut ist, eine solche Viskosität bei der Anwendungstemperatur des Bitumens besitzt, daß die innere Schicht mit dem Bitumen geschmolzen wird und mit diesem auftragbar ist.

2. Packung nach Anspruch 1, dadurch gekennzeichnet, daß die innere und äußere Schicht (10, 11) einen nahtlosen, schlauchförmigen Aufbau besitzen und einen im wesentlichen gleichen Durchmesser aufweisen.

3. Packung nach Anspruch 2, dadurch gekennzeichnet, daß die innere Schicht (10) aus einem Polyäthylenfilm niedriger Dichte und die äußere Schicht (11) aus einem hochschmelzenden Polyamidfilm besteht.

4. Packung nach Anspruch 3, dadurch gekennzeichnet, daß der Polyäthylenfilm eine Dicke im Bereich von 0,02 bis 0,07 mm und der Polyamidfilm eine Dicke im Bereich von 0,02 bis 0,1 mm aufweisen.

5. Packung nach einem der Ansprüche 2, 3 und 4, dadurch gekennzeichnet, daß ein Gleitmaterial zwischen oder in der inneren Schicht und/oder der äußeren Schicht eingebracht ist.

6. Packung und Anspruch 5, dadurch gekennzeichnet, daß das Gleitmaterial eine Polyäthylen-Stammischung niedriger Dichte ist, die einen Gleitzusatz enthält.

7. Packung nach Anspruch 6, dadurch gekennzeichnet, daß die Polyäthylen-Stammischung niedriger Dichte, die den Gleitzusatz enthält, entweder in eine oder in beide der inneren und äußeren Schichten (10, 11) enge-

bracht ist, zur Bildung einer Gleitoberfläche an der Grenzfläche der inneren und äußeren Schicht.

8. Packung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß die äußere Schicht (11) undurchlässig ist gegenüber einem Durchdringen von enthaltenem bituminösem Produkt, Bestandteilen hieraus oder Erdölzusätzen, die ggf. in dem bituminösen Produkt enthalten sind.

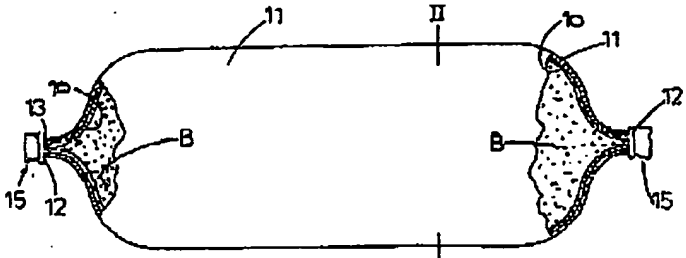

FIG. 1.

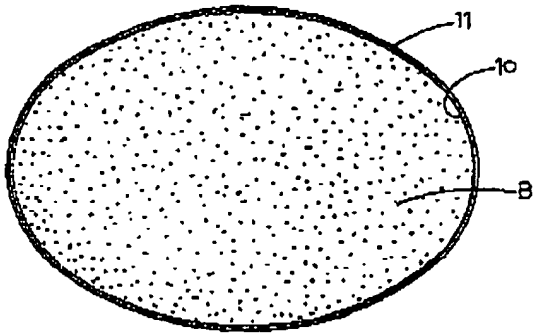

FIG. 2.

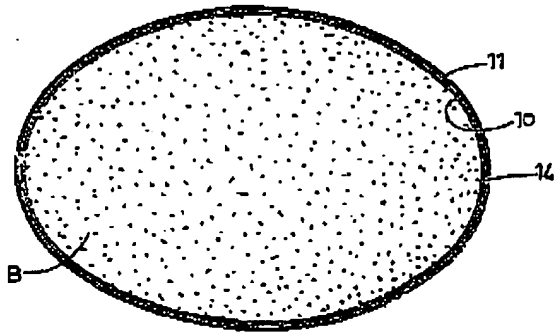

FIG. 3.